REMARKS

The following is responsive to the Patent Office Action mailed June 15, 2004. Claims 1 to 4, 7 to 10 and 13 have been cancelled. Claim 5 has been amended to incorporate the subject matter of Claim 6 and Claim 11 has been amended to incorporate the subject matter of Claim 13. Both Claims 6 and 13 were objected to as being dependent upon a rejected base claim, but the Examiner indicated that Claims 6 and 13 would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. Thus, the Applicant respectfully submits that Claims 5 and 11 are allowable based upon this finding.

The Applicant further respectfully submits that new Claims 14 to 25 patentably distinguish over the prior art for the reasons set forth below.

The Prior Rejection

In the Office Action mailed June 15, 2004, the Examiner rejected Claims 1, 2, 4, 5 and 11 as anticipated by U.S. Patent No. 5,949,209 of ***Okamoto, et al.*** under 35 U.S.C. § 102(b). Claim 1 was also rejected as anticipated by U.S. Patent No. 6,328,799 of ***Inoue, et al.*** under 35 U.S.C. § 102(b) and Claim 12 was rejected as unpatentable over the ***Okamoto, et al.*** patent under 35 U.S.C. § 103(a). The Applicant respectfully traverses these rejections but further submits that new Claims 14 to 25 patentably distinguish over the disclosures of these patents for the reasons set forth below.

As noted by the Examiner, the ***Okamoto, et al.*** reference discloses a robotic paint applicator 1 and a method of protecting a robotic paint applicator in a paint spray booth having a potentially combustible atmosphere. However, the Applicant respectfully traverses the finding by the Examiner that the ***Okamoto, et al.*** patent teaches a housing enclosure "containing an explosion proof electric motor including a motor housing having a gas inlet and a gas outlet" and

wherein the gas outlet directs non-combustible gas into the robot housing enclosure as discussed further below. The ***Okamoto, et al.*** reference teaches locating the electric motors 861, 862, 863 and 864 in four sealed pressurized chambers, as follows (col. 5, lines 34 to 55):

> In operation, before the robot **1** is energized, pressurized air is supplied from the air unit **118** to the respective four pressurized chambers through the air pipe **44**, the manifold 6 and the air pipes **400, 442, 443** and **444**. Return air from the respective four pressurized chambers is exhausted into the air in the four air vent pipes, to the vent manifold **6**, the four flow switches **54**, the pressure switches **48** and to the exhaust valves **49**. When the pressures detected by the respective pressure switches **48** all reach a preset pressure, the four exhaust valves **49** open to purge the air in the respective pressure chambers. After respective measured amounts of pressurized air, which are respectively computed to be a predetermined percentage of the volume of the respective pressurized chambers, are purged, the respective exhaust valves **49** are closed. The robot is then energized. During the time the robot is energized, each the pressure in each of the pressurized chambers is kept above the predetermined air pressure set by the pressure switches **48**. When the air pressure in any one of the four pressurized chambers falls below the predetermined air pressure set by the pressure switches **48**, one of the pressure switches **48** or flow switches **54** acts to stop the supply of electric power to the robot **1**.

That is, as discussed further below, the electric motors are ***not explosion proof*** and the motor housings which contain the electrical components of the electric motors, including the rotor and stator, do not include a gas inlet or a gas outlet. Instead, the ***Okamoto, et al.*** patent teaches enclosing the electric motors in sealed pressurized chambers as set forth above, which is contrary to this invention as discussed further below.

Similarly, the ***Inoue, et al.*** patent teaches locating the electric motors 12m, 13m, 14m, $15m_1$, $15m_2$ and $15m_3$ in a pressurized chamber 16 provided in the robot 10. (Col. 3, lines 32 to 48). That is, pressurized air is supplied to the pressurized chambers, ***not the motor housings***, as follows (col. 3, lines 50 to 60):

> The respective pressurized chambers **16a**, **16b**, **16c** and **16d** are supplied with air having a pressure higher than an atmospheric pressure, for example about 3Pa, through an air supply hose (not shown) so as to prevent inflammable gas and explosive gas from entering the pressurized chamber. Gas supplied to the pressurized chamber may not be exhausted.

> Alternatively, gas supplied into the pressurized chamber may be exhausted through an exhaust hose communicating with the pressurized chamber. In that case, the flow of supply and exhaust air is adjusted to a predetermined value.

Thus, the ***Inoue, et al.*** patent does not teach a housing enclosure "containing an explosion proof electric motor including a motor housing having a gas inlet and a gas outlet spaced from the inlet" as found by the Examiner in her initial rejection and a source of non-combustible gas "circulating non-combustible gas through the motor housing and the gas outlet into the housing enclosure."

Thus, as set forth above, the Applicant respectfully traverses the initial rejection by the Examiner.

The Disclosure of this Invention

As set forth in the Background of the Invention of this application, "The prior art has proposed flooding the section compartments or enclosures containing 'non-explosion proof motors' with 'inert gas,' such as air or nitrogen, to prevent entry of potentially combustible atmosphere in the paint spray booth." First, there are compartments within the robot component enclosures and second, conventional robots do not run continuously. Thus, the combustible atmosphere in a paint spray booth, for example, may be received in these compartments within the enclosures and particularly the motor housings of the electric motors during shift changes, shut down, etc. During start up, this combustible atmosphere within the motor housings, for example, may cause an explosion even when the motors are enclosed within a substantially air-tight chamber or enclosure.

The robot of this invention solves this problem by directing non-combustible gas directly ***into the electric motor housings containing the rotor and stator through a gas inlet***, circulating the non-combustible gas through the motor housings at a first pressure to purge the motor housings of combustible gas and the non-combustible gas is then directed to the robot housing

enclosure through the gas outlet of the motor housing to purge the robot enclosure or enclosures. Following purging, the non-combustible gas is directed to the inlet of the motor housing at a second lower pressure above atmospheric pressure to maintain a positive pressure of non-combustible gas in both the motor housings and the robot compartment enclosure or enclosures. This invention thus eliminates the requirement for conventional explosion proof electric motors having a heavy wall sealed housing or enclosing the electric motors in sealed chambers or enclosures as taught by the prior art, including the ***Okamoto, et al.*** and ***Inoue, et al.*** patents discussed above. This invention not only simplifies the construction of a robot in a potentially combustible atmosphere, such as a robotic paint applicator, but also assures purging of the motor housings of the electric motors, particularly during start up following a shift change or shut down.

The Newly Presented Claims

As set forth above, the Applicant respectfully traverses the Examiner's initial rejection of Claims 1, 2, 5, 11 and 12 for the reasons set forth above, and requests reconsideration of the rejection with regard to new Claims 14 to 25 for the reasons set forth below.

Claim 14 claims a "robot for use in a potentially combustible atmosphere" including a "substantially air-tight first robot component enclosure having an explosion proof motor therein" and "a second robot component enclosure mounted on said first robot component enclosure for movement relative to said first robot component enclosure upon actuation of said explosion proof electric motor." As set forth above, the electric motors disclosed in the ***Okamoto, et al.*** and ***Inoue, et al.*** patents are not "explosion proof" and must therefore be contained in a sealed chamber or enclosure.

Claim 14 further recites that the explosion proof electric motor includes "***a motor housing enclosing electrical components of said electric motor including a rotor and stator***"

and the motor housing "having a gas inlet ***communicating with said rotor and stator*** and a gas outlet spaced from said gas inlet." As set forth above, the inlet to the sealed enclosures which contain the electric motors of ***Okamoto, et al.*** and ***Inoue, et al.***, do not have an electric motor with a motor housing "***enclosing electrical components***" of the electric motor "***including a rotor and stator***" or "a ***gas inlet communicating with said rotor and stator***." Instead, the gas inlet of the robotic paint applicators disclosed in the ***Okamoto, et al.*** and ***Inoue, et al.*** patents communicates with a sealed pressurized chamber which encloses the electric motors and thus any combustible gas received in such chambers could be received within the motor housing of the electric motors and result in an explosion.

Claim 14 further recites that a source of non-combustible gas under pressure is connected to the gas inlet of the motor housing "***directing non-combustible gas under pressure into said motor housing including said rotor and stator***, thereby purging and preventing entry of potentially combustible atmosphere into said motor housing," and the gas outlet of the motor housing directing non-combustible gas under pressure into the first substantially air-tight robot enclosure, thereby purging and "maintaining a positive pressure of non-combustible gas in said substantially air-tight first robot component enclosure and preventing entry of potentially combustible atmosphere into said first robot component enclosure." As set forth above, the robotic paint applicators disclosed in the ***Okamoto, et al.*** and ***Inoue, et al.*** patents do not include a motor housing "enclosing electrical components of said electric motor including a rotor and stator" or a gas inlet "communicating with said rotor and stator" and thus do not disclose directing gas under pressure into a substantially air-tight robot component enclosure from an outlet of the motor housing (as defined above) to maintain a positive pressure of non-combustible gas in the substantially air-tight first robot component enclosure." Thus, the Applicant respectfully submits that Claim 14 patentably distinguishes over the prior art for the reasons set forth above.

Claim 15, which is dependent upon Claim 14, recites that the second robot component enclosure is also substantially air-tight and includes a "second explosion proof electric motor" having a second motor housing enclosing electrical components of the second electric motor "***including a rotor and a stator***" and a gas inlet and gas outlet in the motor housing receiving non-combustible gas under pressure through the gas inlet and directing non-combustible gas from the motor housing into the substantially air-tight second robot component enclosure. The Applicant respectfully submits that Claim 15 also patentably distinguishes over the prior art for the reasons set forth above. Claim 17, which is dependent upon Claim 14, recites that the robot is a robotic paint applicator for use in a paint spray booth wherein the second robot enclosure includes a robot arm having a paint applicator. Claim 18, which is dependent upon Claim 14, recites that the explosion proof electric motor is an electric servomotor, the motor housing is substantially air-tight "having an inlet chamber, including the gas inlet, and a ***second chamber containing the electrical components of the electric motor, including the rotor and stator*** and the gas inlet circulates the non-combustible gas through the second chamber. There is no disclosure or suggestion in either of the references cited by the Examiner which disclose an electric motor as specifically defined in Claim 18 and thus the Applicant respectfully submits that Claim 18 patentably distinguishes over the prior art.

Claim 19 is more specifically directed to a robotic paint applicator, including a first "substantially air-tight robot housing enclosure having a first explosion proof electric motor therein, a second substantially air-tight robot housing enclosure mounted on the first for relative movement relative to the first robot housing enclosure and also including a second explosion proof electric motor. As set forth above, neither of the references cited by the Examiner disclose a robotic paint applicator having explosion proof electric motors, particularly as recited in Claim 19, wherein the first and second explosion proof motors include "a motor housing enclosing electrical components of said electric motors ***including a rotor and a stator***" and a gas inlet

"***communicating with said rotor and stator*** and a gas outlet." As set forth above, neither of the references cited by the Examiner disclose a motor housing as defined in Claim 19, but instead enclose the electric motors in a sealed chamber as set forth above.

Claim 19 further recites a source of non-combustible gas located outside the paint spray booth "connected to each of said gas inlets of said motor housings" of the first and second explosion proof motors directing non-combustible gas into the housings "***to said rotor and stator***, purging said motor housings of combustible gas and maintaining a positive pressure of non-combustible gas within said motor housings." Thus, Claim 19 further defines over the references cited by the Examiner by specifically reciting that the source of non-combustible gas is directed into the motor housings to the rotor and stator to purge the motor housings of combustible gas.

Finally, Claim 19 recites that the gas outlets of the motor housings direct non-combustible gas under pressure into the first and second substantially air-tight robot housing enclosures, purging the first and second robot housing enclosures of combustible gas and maintaining a positive pressure of non-combustible gas within the first and second robot housing enclosures. As will be understood from the discussion above, the references cited by the Examiner do not disclose purging the robot housing enclosures or maintaining a positive pressure of non-combustible gas within the robot housing enclosures through an outlet of the motor housings as specifically defined in Claim 19.

Claims 20 and 21 are both dependent upon Claim 19, wherein Claim 20 includes the limitations of Claims 3, 6 and 13, which were indicated as allowable by the Examiner and thus Claim 20 patentably defines over the prior art cited. Claim 21 further recites that one of the robot housing enclosures includes a third explosion proof electric motor having a motor housing enclosing the electrical components of the third explosion proof electrical motor including the

rotor and stator, a gas inlet and outlet, etc. which, as set forth above, patentably distinguishes over the prior art.

Claim 22 is directed to a method of protecting a robot in a potentially combustible atmosphere, wherein the robot includes a substantially air-tight robot enclosure having an explosion proof electric motor ***including a housing enclosing the electrical components of the motor including a rotor and a stator*** as described above, wherein the method includes directing a non-combustible gas into the motor housing at a first pressure ***including the rotor and stator***, directing the non-combustible gas into the inlet of the motor housing at a second pressure greater than atmospheric, but less than the first pressure to maintain a positive pressure of non-combustible gas in the motor housing, as described above, and further "actuating said explosion proof electric motor with ***said rotor and stator in a non-combustible atmosphere within said motor housing***." As set forth above, the references cited by the Examiner do not disclose the method as defined in Claim 22 because the electric motors are not explosion proof and a non-combustible gas is not directed in the motor housing as specifically defined in Claim 22. Further, the references cited by the Examiner do not disclose actuating the explosion proof electric motors "with said rotor and stator in a non-combustible atmosphere within the motor housing." Thus, the Applicant respectfully submits that Claim 22 also patentably defines over the prior art.

Finally, Claims 23 to 25 specifically define the preferred pressure of non-combustible gas both for purging and maintaining a positive pressure of non-combustible gas both within the motor housing and the robot enclosure. The Applicant respectfully traverses the Examiner's finding that such pressures would have been obvious to a person of ordinary skill in the art to determine the appropriate pressure range to inhibit explosion. First, none of the references cited by the Examiner disclose or suggest directing a non-combustible gas into a motor housing containing the electrical components of the electrical motor including the rotor and stator, and

thus the preferred pressure ranges would not be known to a person of ordinary skill in this art. Thus, the Applicant respectfully submits that Claims 23 to 25 patentably distinguish over the prior art.

For the reasons set forth above, the Applicant respectfully submits that all of the claims in this application patentably distinguish over the references cited by the Examiner and allowance is therefore respectfully requested.

Accordingly, it is respectfully submitted that the Application, as amended, is now presented in condition for allowance, which allowance is respectfully solicited. Although it is believed that no fee is due for the filing of this Amendment, the Commissioner is authorized to charge our Deposit Account No. 08-2789 for any additional fees or credit the account for any overpayments regarding this Amendment. Further and favorable reconsideration of the outstanding Office Action is hereby requested.

Respectfully submitted,

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